

ATTACHMENT A

Remarks

Claims 1-7, 9-10, and 12 are pending in the present application. By this Amendment, Applicant has amended claims 1-7 and 9-10, added new claim 12, and cancelled claims 8 and 11. Applicant respectfully submits that the present application is in condition for allowance based on the discussion which follows.

The drawings were objected to under 37 C.F.R. § 1.83(a) alleging that the drawings do not show all aspects recited in claims 8 and 11. By this Amendment, Applicant has canceled claims 8 and 11 rendering the objection to the drawings now moot.

The specification was objected to alleging that the Abstract, due to its length, was not in compliance with U.S. practice and for the specification including informalities. By this Amendment, Applicant has submitted a replacement Abstract and amended various portions of the specification thereby obviating the objection to the specification and correcting other informalities.

Claims 1, 2, 6, 7, 9, and 10 were objected to for including informalities. Further, claims 1-11 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. By this Amendment, Applicant has amended claims 1-7 and 9 to correct the informalities and to put the claims in compliance with 35 U.S.C. § 112, second paragraph.

Claims 1-11 were rejected under 35 U.S.C. § 102(b) as being anticipated by WO 84/04367 (hereinafter "WO '367").

Contrary to the rejection, claims 1-11 are not anticipated by WO '367. The present invention is directed to a hydromechanical clamping device which on one end is for mounting in a machining device and another end for releasably holding a tool shaft.

In sharp contrast to the present invention, WO '367 discloses a hydraulic frictional coupling for connecting two shafts or a shaft and a hub. The coupling comprises an annular chamber with an annular piston that, with an axial displacement, causes radial expansion or compression of the chamber for achieving a junction. Although the frictional coupling shown in WO '367 discloses a locking mechanism, WO '367 does not relate to a hydromechanical clamping device to be, with one end thereof, mounted in a machining device, and with another end to releasably hold a shaft tool. Instead, WO '367 relates to a completely different area of technology, i.e., mechanical power transmission systems. WO '367 fails to provide any teaching, let alone suggestion, that its disclosure could be modified or adapted for implementation in a hydromechanical clamping device in accordance with the present invention. Consequently, WO '367 relates to a completely different problem and area of technology, and thus non-analogous art which cannot be considered an anticipatory device of the present invention.

Further, the present invention provides features not taught or suggested in WO '367. The present device provides a strong tool mount with very good centering and balancing of the tool while at the same time providing a strongly clamped tool. This is very advantageous in machining devices. Even further, the construction of the present invention provides for a tool to receive radial forces through the outer sleeve of the device. This is illustrated with arrows in Fig. 2 of the present application. Due to the

larger diameter of the present outer sleeve, the present invention is capable of receiving considerably larger forces than previously known devices. As a result, the present device permits a clamped tool to work under a very high load without generating vibrations which may lead to grooves being formed in cut surfaces. Accordingly, the present clamping mechanism is used for obtaining a strong tool mount having a high flexural rigidity, i.e., ability to withstand radial forces. WO '367 does not disclose any such functionality or capability of its device disclosed. To the contrary, the object of the WO '367 device is to resist axial thrust, i.e., forces in the axial direction.

Based on the foregoing, the present invention is novel and not anticipated by WO '367.

Claims 1-3 and 5-8 were rejected under 35 U.S.C. § 102(b) as being anticipated by Firestone U.S. Patent No. 3,208,759 (hereinafter "Firestone").

Contrary to the rejection, Firestone fails to teach or suggest in any way the present hydromechanical clamping device. In the present invention, locking of a tool is achieved by radial expansion of an inner sleeve whereas, in Firestone, locking is achieved by axial displacement of an inner sleeve. Specifically, in Firestone, its hydromechanical clamping device has one end mounted in a machining device, and another end for releasably holding a shaft tool. The clamping device comprises an inner sleeve (40) with an axial bore for receiving a shaft of the shaft tool. The inner sleeve (40) and an outer sleeve (10) encloses a chamber in which an annular piston (15) is enclosed, which piston (15), by means of hydraulically operating means, is displaceable in an axial direction. The piston (15) and the inner sleeve (40) have interacting conical surfaces. Axial displacement of the piston (15) in a locking direction,

however, does not cause radial compression of the inner sleeve for clamping the shaft tool. Instead, when the piston is displaced in the locking direction, a bevel (16) of the piston engages balls (60) and forces them into a seated position (as shown in Firestone, Figs. 1 and 2). When the balls are forced inwardly, they engage a taper (59) of the inner sleeve which forces the inner sleeve upwardly in the figure. As the inner sleeve is forced upwardly, the taper (52) of the inner sleeve (40) presses against the taper (72) of the collet and forces the collet into a closed position.

Consequently, the locking mechanism of Firestone is achieved by an axial displacement of the inner sleeve, and not, as in the present invention, a radial expansion of the inner sleeve. The present invention has the advantage that it produces a strong tool mount with very good centering and balancing of the tool while, at the same time, providing a strongly clamped tool. Therefore, the device according to the present invention is totally different from the device according to Firestone, and therefore the present device is not anticipated by Firestone.

Claims 1-3 and 5-8 were rejected under 35 U.S.C. § 102(b) as being anticipated by German Patent No. DE 3 503 362 (hereinafter "DE '362").

DE '362 also discloses a hydromechanical clamping device to be, with one end thereof, mounted in a machining device, and with another end to releasably hold a shaft tool. The DE '362 clamping device comprises an inner sleeve (8). The inner sleeve (8) and an outer sleeve (2) enclose a chamber in which an annular piston (3) is enclosed, which piston (3) by means of hydraulically operating means is displaceable in an axial direction.

Like Firestone, contrary to the rejection, DE '362 does not teach or in any way suggest the present hydromechanical clamping device having an axial displacement of the piston in a locking direction to cause radial compression of the inner sleeve for clamping the shaft tool. Instead, the DE '362 device functions essentially as the device disclosed in Firestone as described above. That is, a conical portion of the inner sleeve (8) is forcibly pushed forwards onto a conical portion of a collet (4) upon displacement of the piston (3), whereat balls (19) displace the inner sleeve (8) radially in a manner similar to the device disclosed in Firestone. Consequently, the device according to the present invention is totally different from the device according to DE '362. Furthermore, DE '362 fails to provide any suggestion or motivation for one of ordinary skill in the art to modify the disclosure of DE '362 to arrive at the present invention. Therefore, the present invention is novel and in no way obvious in view of DE '362.

In view of the foregoing, claims 1-3 and 5-8 are not anticipated by 35 U.S.C. § 102(b) by DE '362.

Claim 4 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Firestone. For the same reasons as discussed above with regard to the 35 U.S.C. § 102(b) rejection of claims 1-3, 5-8 and 9-11, Firestone fails to teach or suggest the subject matter claimed.

In view of the foregoing, Applicant respectfully submits that the present application is in condition for allowance.

END REMARKS